2001

Tariff/Pricing Committee

Issue papers

- Differentiated Tariffs in Wholesale & Retail Electricity Markets
- Cost Allocation between Heat & Electric Power in Combined Energy Production at Cogeneration Plants
- Structure of the Power Sector & Rates Charged for Monopoly Services

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Dear colleagues,

The Tariff/Pricing Committee was established in December 1998 as a part of the Energy Regulators Regional Association (established by NARUC in cooperation with US Agency for International Development). In December 2000, the Committee was officially approved as one of the two ERRA standing committees.

In the period from 1999 to 2001, the Committee has reviewed 13 topics. They were formulated taking into account wishes and priority objectives of the regulatory organizations from member countries. The process of reforms in these countries is at different phases, therefore, for some countries the issues considered under these topics are current problems requiring immediate solution, while for the other countries they represent pending problems that these countries will have to resolve in the framework of future reforms. Irrespective of that, all considered topics are of certain value and are directly related to main functions of the regulatory organizations.

Cooperation within the framework of the Committee, as well as exchange of experience and views of regulators on various topics that are of mutual interest, promotes better efficiency of their work, helps to improve professional skills and to cope with complex problems they are facing in the course of regulating their energy sectors.

I would like to express my gratitude to all Committee members for their creative contribution in the work of the Committee, I also want to thank US Agency for International Development and NARUC for their comprehensive assistance, support and valuable suggestions.

I hope that our fruitful cooperation will continue in future and would be provide valuable assistance in the process of our countries' transition to free market economies.

Sincerely,
V.Movsesyan
Chairman,
Energy Commission of the Republic of Armenia,
Chairman of the Tariff/Pricing Committee

Publication and dissemination of the documents pertaining to the 5th Annual Energy Regulatory Conference for Central/Eastern Europe and Eurasia was made possible through support provided by the Energy and Infrastructure Division of the Bureau of Europe and Eurasia under the terms of its Cooperative Agreement with the National Association of Regulatory Utility Commissioners, No. EE-N-00-99-00001-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development.

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5th Annual Energy Regulatory Conference, Sofia, Bulgaria, 3-5 December 2001

Topic 1: Differentiated Tariffs In Wholesale And Retail Markets

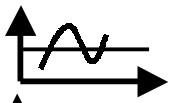
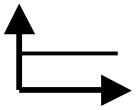
1. PURPOSE OF THE PAPER

The present paper should represent a tool for highlighting issues to be considered by the regulators related to pricing methodologies, zone and time differentiation, indicating areas where further efforts are needed and to suggest possible follow-on activities for the CEE/Eurasia Tariff Committee.

At the same time the paper serves other more general purposes such as:

- To review the extent to which the energy sector has been restructured and the market opened;
- To identify activity areas where the prices are regulated and areas where competition was implemented;
- To identify approaches used in the CEE/Eurasia region for addressing zone and time differentiation; and,
- To share between CEE/Eurasia Tariff Committee members the experience in addressing the above mentioned issues, learning from others' mistakes in the hope of finding the best solutions.

Abbreviate and Legend:

N.A.	not available
REC	Regional Electricity Company
OTH	other
	time differentiation based on load curve shape
	no time differentiation
	time differentiation based on costs

2. ANSWERS TO THE QUESTIONNAIRE

A. <u>Overview for the electricity sector CEE/Eurasian countries:</u>

The electric power sector in CEE/Eurasian countries is unbundled. In most of the countries, except Albania, the generation was separated from transmission and distribution, but the distribution and supply are still bundled. A general fact is that the majority of the companies in this sector are state-owned. The following table presents the wholesale market characteristics in each of the analyzed countries:

Table 1: *The wholesale electricity market in CEE/Eurasian countries*

COUNTRY	The wholesale market is based on:
Albania	• vertically integrated monopoly, state owned
Armenia	• single buyer model
Bulgaria	• single buyer model
Estonia	• bilateral contracts model
Georgia	• N.A.
Hungary	• single buyer model, with **PPAs**
Kyrgyz Republic	• vertically integrated monopoly
Latvia	• Single buyer model Bilateral contracts for eligible consumers (8 consumers in Latvia annual consumption greater than 40 GWh) will be introduced. Other consumers are retail consumers. Monopoly power company "Latvenergo" purchases the shortfall of energy and TSO all the electric energy produced in Latvia.
Moldova	• bilateral contracts model
Poland	• N.A.
Romania	• bilateral contract model • a regulated market (85% from electricity demand) • competitive markets (15% from electricity demand) consisting in negotiated bilateral contracts and the spot market
Russian Federation	• bilateral contracts model. Surplus power (in excess of the balance approved by the Russian Federal Energy Commission) is sold at auction.
Ukraine	• single buyer model: the Enegorynok Public Company, which then provides wholesale delivery of electricity to all energy supply companies, and additionally serves as the administrator of the settlement system for the Wholesale Electric Power Market.

B. Generation:

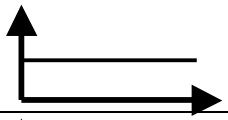
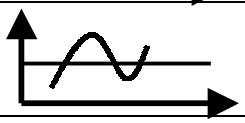
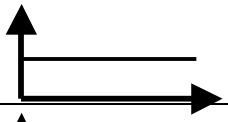
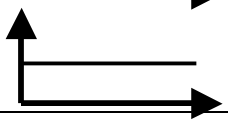
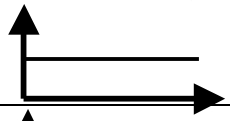
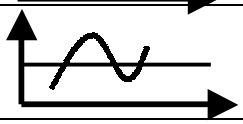
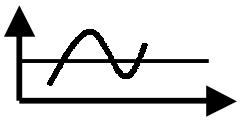
The structure of the wholesale market in each country is influencing generation prices. Therefore, these prices are: 1) entirely regulated by a regulatory authority in most of the CEE/Eurasian countries, 2) entirely set by the market in Estonia and Poland and 3) partly regulated and partly set by negotiation or spot markets in Latvia, Romania and Ukraine. Transmission costs are not included in generation costs in most of the countries except Russian Federation and Ukraine. More details about generation prices are presented in the following table:

Table 2: ***Generation prices***

COUNTRY	Generation prices are:	Ancillary services are:	Transmission costs:	Generation includes COGEN units:
Albania	-vertically integrated monopoly, state owned			
Armenia	regulated by a overnment oversight uthority	-priced separately on regulated basis -provided by the single buyer, the costs are not differentiated or included in the marginal price of the company who provide it	-are not included in generation costs	-yes
Bulgaria	-regulated by a government oversight authority	-cost included in generation prices -will be priced separately on a regulated basis beginning in 2002 -secondary frequency, reactive power and voltage management. *Payment for ancillary services is based on bilateral contracts between IIPs and the transmission company*.	-are not included in generation costs	-the prices for cogenerated electricity and heat, are splitted using the residual value method
Estonia	-set by negotiation with suppliers or eligible consumers	-cost icluded in generation prices	-are not included in generation costs	-no
Georgia	-regulated	-cost icluded in generation prices	-are not included in generation costs	-no
Hungary	-regulated	-cost icluded partly in generation prices, partly in transmission company margin	-are not included in generation costs	-the heat produced for district heating can influence the individual sector. Price of the same unit by social considerations for a short (max. 4 years) period.
Kyrgyz Republic	-vertically integrated monopoly, state owned			

Table 2(second part)**:** ***Generation prices***

COUNTRY	Generation prices are:	Ancillary services are:	Transmission costs:	Generation includes COGEN units:
Latvia	-regulated -set by negotiation with suppliers or eligible cons. (legislation allows, till now cons. didn't take use of it)	-cost icluded in generation prices	-are not included in generation costs	-for the CHP with installed capacity more than 4 MW prices are set by Regulator in accordance with the methodology -prices are cost reflective. For small CHP electricity prices are determined by the regulation of Cabinet of Ministers.
Moldova	-regulated	-cost icluded in generation prices	-are not included in generation costs	-the allocation of costs for electyricity and heat cogeneration is made pursuant to the economical principle
Poland	-set by the wholesale market -power exchange operates as a day-ahead market; about 70 % of consumption is covered by long-term power purchase agreements.	-priced separately on regulated basis -in the future it will priced separately in an ancilary services market	-are not included in generation costs	-heat prices can influence electricity prices and depend on method of dividing costs between heat and electricity.
Romania	-regulated (85%) -set by the spot market -set by negotiation with suppliers or eligible consumers	-priced separately on regulated basis; there are regulated prices for each type of ancillary services	-are not included in generation costs	-ANRE set out a methodology, compulsory for all economic agents from energy sector, for splitting costs between electricity and heat in cogeneration units, in order to avoid cross subsidy
Russian Federation	-regulated in the wholesale and retail markets.	-priced separately on a regulated basis	-are included in generation costs.	-heat prices can influence electricity prices when various profit margins are set, which is permitted
Ukraine	-regulated by NERC for nuclear power plants, hydroelectric plants, and CHPs. -set by the wholesale market – for generating facilities of CHPs (approximately 40% of all the electric power generated) -set by negotiation with suppliers or eligible consumers, with IPPs (small hydroelectric and CHP) that are not members of the Wholesale Market	-cost icluded in generation prices -the cost of these services represents about 2% of the wholesale price, and 0.23 kopecks (or an average of about 1.5%) of the retail price paid by the end users.	-are included in generation costs -0.22 kopecks or 1.7% of the wholesale electricity price and 1.46% of the retail price	-the prices for electricity are set by the Price Offices of the Oblast Administrations. The price of heat affects the price of electricity produced by the cogeneration plants, that is when the company itself allocates costs between the two types of products

COUNTRY	Time differentiation	Comments:
Albania	-	-
Armenia		-no differentiation
Bulgaria		-the system's load curve pattern
Estonia		-hourly zones based on the system's load curve pattern
Georgia	-	-N.A.
Hungary		- no time differentiation
Latvia		- no time differentiation
Moldova		- no time differentiation
Poland		-hourly differentiation, for separate parts of wholesales market.
Romania		- hourly differentiation
Russian Federation	 	-generation prices are differentiated in the wholesale market by zones (Central, Northwest, South, Urals, Siberia, Far East) and in the retail market within each constituent member of the federation. -time zones are determined based on the country's geography for the wholesale market, and on load curve and generation costs in the retail market
Ukraine		-hourly differentiation
Kyrgyz epublic	-	-

C. Transmission:

Due to the chosen model, some countries like Bulgaria and Hungary have no transmission tariff at present: the single buyer's costs in operating the high-voltage grid and its transmission costs are included in the wholesale price at which the single buyer sells power to the distribution companies and to major customers. Generally, transmission costs are allocated 100% to consumers and in most of the countries include a100 % energy charge. In most of the countries these tariffs are not time differentiated. Transmission tariffs level is regulated based on RPI-X or rate of return methods, the last one being frequently used in most of the CEE/Eurasian countries. Energy transit service is not charged by transmission tariffs.

Table 3: ***Transmission tariffs***

COUNTRY	Transmission losses	Transmission costs are allocated:	Transmission tariffs include:	Transmission tariffs are regulated:	Energy transit
Albania	-vertically integrated monopoly, state owned				
Armenia	-are considered as cost for transmission activity and included in transmission tariffs	-N.A.	-capacity charge represents 71,5%of the tariff; 28,5% is electricity charge	-based on profit rate	-there is no transit
Bulgaria	-are considered as cost for transmission activity and included in transmission tariffs	-100% to consumers	-there is no transmission tariff at present because there is no free access to the grid yet	-will be regulated based on RPI – X	-there is no transit via Bulgaria.
Estonia	-are considered as cost for transmission activity and included in transmission tariffs	-100% to consumers	-capacity charge	-based on rate of return	- is charged by transmission tariffs
Georgia	-are considered as cost for transmission activity and included in transmission tariffs	-N.A.	-energy charge represent 10,6% of the tariff	-based on rate of return	-is not charged by transmission tariffs; it is regulated case-by-case basis in the contracts
Hungary	-considered as cost for transmission activity and included in transmission tariffs margin	-100% to consumers	**-t**here is no transmission tariff at this moment. There is **a** "general producer price + transmission company margin" = "wholesale price" = "purchase price (tariff) for distribution companies".	-rate of return (for justified costs included in starting margin) -RPI – X (for yearly margin modifications during the price regulation period)	-energy transit service is charged by tariff based on bilateral contracts.

Table 3(second part)**:** ***Transmission tariffs***

COUNTRY	Transmission losses	Transmission costs are allocated:	Transmission tariffs include:	Transmission tariffs are regulated:	Energy transit
Kyrgyz Republic	-vertically integrated monopoly, state owned				
Latvia	-are considered as cost for transmission activity and included in transmission tariffs	-100% to consumers	-energy charge representing 100% of the tariff	-based on RPI – X method	-is not charged by transmission tariffs
Poland	-considered as cost for transmission activity and included in transmission tariffs margin	-100% to onsumers	-capacity charge representing 71,43 % of the tariff -energy charge representing 28,57 % of the tariff (without variable fee)	-based on rate of return	-is charged by transmission tariffs
Romania	-are considered as cost for transmission activity and included in transmission tariffs	-100% to consumers	-energy charge represent 100% of the tariff	-to recover all costs: capital costs, maintenance, losses, transmission system security, supplementary costs, etc.	-is charged by transmission tariffs
Russian Federation	-included in transmission tariffs when tariffs are calculated based on voltage levels; -allocated to generation when generation tariffs are calculated.	-100% to consumers	-N.A.	-N.A.	-N.A.
Ukraine	-partially are included in transmission tariffs and partially in the tariffs for transmitting electricity through local grids. All users pay the Wholesale Market the price of power with losses factored in.	-100% to consumers	-energy charge represent 100% of the tariff	-based on RPI – X method	-charges for transit from one oblast to another are not included in the overall charges

Table 4: ***Transmission tariffs differentiation***

COUNTRY	Transmission tariffs are time differentiated	Comments
Albania		
Armenia	-No	-
Bulgaria	-No	-
Estonia	-N.A.	-
Georgia	-No	-
Hungary	- Yes	-purchase price (tariff) for distribution companies (the wholesale price) has a capacity charge and a two time zones (peak, off-peak) energy charge.
Kyrgyz Republic		-
Latvia	-No	-
Poland	-No	-
Romania	-No	-
Russian Federation	- Yes	-tariffs in the wholesale and retail markets are differentiated: single-rate, dual-rate, and zonal (based on time of day).
Ukraine	-No	-

D. DISTRIBUTION

Due to the fact that distribution and supply activities were not yet unbundled, in many countries (like Bulgaria, Hungary, Moldova and Russia) there are no distribution tariffs yet. In most of the countries the distribution tariffs include 100% energy charge; in Estonia and Poland a distribution tariff includes both capacity and energy charges. Also in most of the countries, these tariffs are time differentiated. At present, the methods to regulate distribution tariffs are rate of return and RPI-X, the last one being preferred for the future.

Table 5: ***Distribution tariffs***

COUNTRY	Distribution tariffs include:	Distribution tariffs level are regulated based on:
Albania	-vertically integrated monopoly, state owned	
Armenia	-energy charge represent 100% of the tariff	-profit rate
Bulgaria	-there are no distribution tariffs as yet.	-will be regulated based on RPI–X
Estonia	-capacity charge representing .60% of the tariff -energy charge representing .40% of the tariff	-rate of return method
Georgia	-N.A.	-rate of return method
Hungary	-there are no distribution tariffs yet.	
Kyrgyz Republic	-vertically integrated monopoly, state owned	
Latvia	-energy charge represent 100% of the tariff	-RPI–X method
Moldova	-there is an uniform tariff for energy supply and distribution. and-energy charge represent 100% of the tariff	-based on the real costs necessary to maintain and operate the networks and based on profit level
Poland	-capacity charge representing 40% of the tariff -energy charge represent 60 % of the tariff	-Rate of return -RPI - X (in the future)
Romania	-energy charge represent 100% of the tariff	-to cover costs
Russian Federation	Not handled separately in the wholesale market.	
Ukraine	-energy charge represent 100% of the tariff	-RPI–X method -changes in the minimum wage, change in amortization, interest rate etc

Table 6: ***Distribution tariffs differentiation***

COUNTRY	Distr.tariffs are time differentiated:	Voltage level differentiation
Albania	vertically integrated monopoly, state owned	
Armenia	-No	-No
Bulgaria	-No	-No
Estonia	-No	-Yes
Georgia	-No	-Yes: 0.4 kV, 6-10 kV, 110-35 kV
Hungary	-there are no distribution tariffs yet	
Kyrgyz Republic	-vertically integrated monopoly, state owned	
Latvia	-No	-Yes: 0,4 kV, 6-20 kV, 110 kV,
Moldova	-No	-No
Poland	-Yes	HL > 110 kV, 1 kV < ML < 110 kV, LL < 1 kV
Romania	-No	-Yes: high voltage lines (110 kV and more), medium voltage lines (1kV-110kV), low voltage lines (under 1 kV), transformers 110 kV/MV, transformers MV/LV.
Russian Federation	Not handled separately in the wholesale market.	-in the retail market, some regions use tariffs for power grid transmission services differentiated by voltage: high—110 kV or more; medium—6 to 35 kV; low—0.4 kV.
Ukraine	-No	-Yes: first class above 35 kV; second class below 35 kV.

E. SUPPLY

Power distribution and customer supply in CEE/Eurasian countries are handled by the distribution companies. There are quite a few separate supply companies yet. In Romania, 20 suppliers were licensed, but only some of them managed to trade and supply electricity and customer services, responding to questions and complaints

F. END-USER TARIFFS

In CEE/Eurasian countries, end-user tariffs for captive consumers are regulated in order to cover the aggregated costs for generation, transmission, distribution and supply. In most of the countries, tariffs are uniform over the country (Bulgaria, Hungary, Latvia, Romania and partially for residential, in Ukraine) or over a region served by a REC (Georgia, Moldova, Poland and partially for industry, in Ukraine). In the Russian Federation, there are end-user tariffs designed and regulated for each geographical zone. In all these countries, end-user tariffs are differentiated by voltage and demand levels and load curve factors. The following table contains a more detailed presentation of end-user tariffs.

Table 7: ***End-user tariffs***

COUNTRY	Tariffs system is organized by:	The tariffs system contains:	Cost aggregation model for the activities in the sector
Albania	-voltage levels -customer type	-simple monomial tariff	-vertically integrated monopoly costs
Armenia	-voltage levels	-simple-part tariff differentiated on two time zones	-costs of generation, transmission and ancillary services

Table 7(second part)**:** ***End-user tariffs***

COUNTRY	Tariffs system is organized by:	The tariffs system contains:	Cost aggregation model for the activities in the sector
Bulgaria	-voltage levels -customer categories (residential and industrial) -- zones, 24-hour periods	-single-rate tariff differentiated by 2 time zones for residential customers -single-rate tariff differentiated on 3 time zones for medium-voltage and low-voltage industrial customers -double-rate tariff differentiated by 3 time zones, for high-voltage industrial customers	***-Wholesale Tariff is composed of:*** -Generating costs -Trading costs -Portion of planning system -Portion of administrative expenses ***Transmission cost*** -Transmission grid costs -System operating costs -Portion of planning system -Portion of administrative expenses + connection charges ***System services*** cost -Ancillary service costs
Estonia	-voltage levels	-simple monomial tariff -monomial tariff differentiated on 2 time zones -monomial tariff with a fixed charge -simple binomial tariff -binomial tariff differentiated on .2 time zones	*-end-users tariffs include:* -generation costs; -transmission costs -distribution costs -supply costs
Georgia	-voltage levels	-simple monomial tariff	-N.A.
Hungary	-voltage levels	-*High voltage tariffs* with 1. two time zones capacity charge + two time zones energy charge 2.with standing charge + two time zones energy charge *Medium voltage tariffs* 1. two time zones capacity charge + two time zones energy charge 2.with standing charge + two time zones energy charge *Low voltage tariffs* 1. two time zones capacity charge + two time zones energy charge 2.with standing charge + one and two time zones energy charge *Public lighting tariff* (with capacity charge + one time zone energy charge) *Residential tariff* (pure energy charge): general controlled, separately measured (off-peak), for electricity industry staff	-N.A.

Table 7(third part)**:** ***End-user tariffs***

COUNTRY	Tariffs system is organized by:	The tariffs system contains:	The cost aggregation model for the activities in the sector
Kyrgyz Republic	-consumer type	-simple single-rate tariff -simple double-rate tariff	-N.A.
Latvia	-voltage levels -demand levels and load factors	-simple monomial tariff -monomial tariff differentiated on 2 time zones -simple binomial tariff -binomial tariff differentiated on 3 time zones	-N.A.
Moldova	-voltage levels -demand levels and load factors	-monomial tariff differentiated on 2 time zones (for residential) and on 3 time zones (for other categories)	*-end-users tariffs include:* -generation costs; -transmission costs -distribution costs -supply costs
Poland	-voltage levels -demand levels and load factors -consumer type (agriculture, transport, etc.) -other (no data)	-binomial tariff differentiated on 3 time zones	-N.A.
Romania	-voltage levels -demand levels and load factors	-simple monomial tariff -monomial tariff differentiated on 2 and 3 time zones -monomial tariff with a fixed charge -simple binomial tariff -binomial tariff differentiated on 2 and 3 time zones	Captive consumers are supplied, at present, by one single supplier, the single buyer, ELECTRICA.S.A., state-owned, that has most of the distribution networks. For the end-user tariff, an average price for electricity supply is computed for each voltage level., consisting of the costs for generation, transmission, ancillary services, Commercial Operator tax, distribution and supply. Based on the average price for each voltage level the tariff coefficients are computed in order to give the consumer the incentive to choose a more complex tariff

Table 7(fourth part)**:** ***End-user tariffs***

COUNTRY	Tariffs system is organized by:	The tariffs system contains:	The cost aggregation model for the activities in the sector
Russian Federation	-consumer categories.	-monomial; -binomial; -zonal (based on time of day).	Power companies' total requirement for financial resources by types of regulated activity in the wholesale and consumer markets is calculated to include funds allocated to production costs and funds expended from their profit
Ukraine	-voltage levels -consumer type (agriculture, transport, etc.) – there are lower rates for agricultural businesses and the rural population in general.	-simple monomial tariff -monomial tariff differentiated 3 time zones	-the rate is set on the basis of the wholesale market price and regional prices for distribution and supply

Table 8: ***End-user tariffs differentiation***

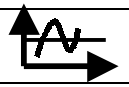
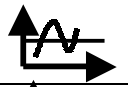
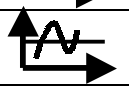
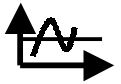
COUNTRY	Tariffs uniformity:	Tariffs differentiation type:
Albania	-uniform all over the country	-seasonal periods **OTH**
Armenia	-uniform all over the country	-day-night differentiation -the definition of time zones is based on the system's load curve 
Bulgaria	-uniform all over the country	-day-night differentiation for residential customers -day-night *peak d*ifferentiation for industrial customers -the definition of time zones is based on the system's load curve pattern 
Estonia	-N.A.	-day-night differentiation -the definition of time zones is based on the system's load curve pattern 
Georgia	-uniform over the region served by a REC	-
Hungary	-uniform all over the country	-differentiation type: -hourly zones during the day (peak, off-peak) -weekend (off-peak) -the definition of time zones is based on the system's load curve pattern 

Table 8 (second part): ***End-user tariffs differentiation***

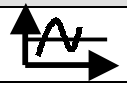
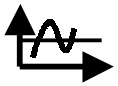
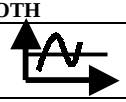
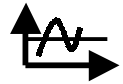
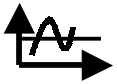
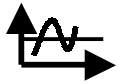
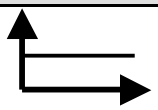
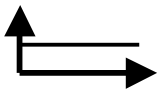
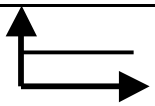
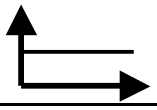
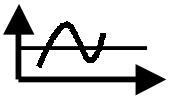
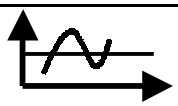
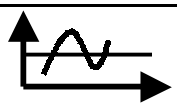
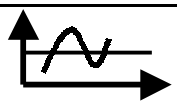
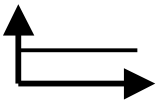
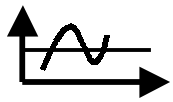
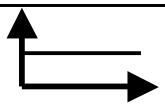
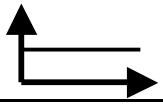
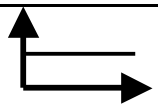
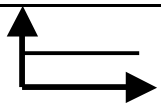
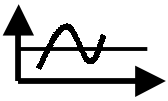
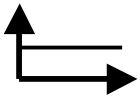
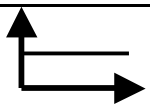
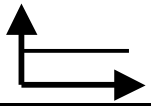
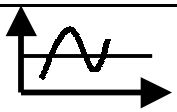
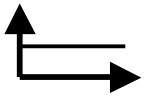
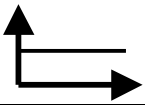
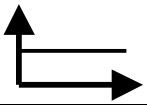
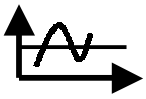
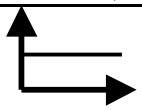
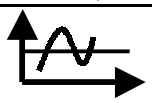
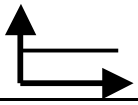
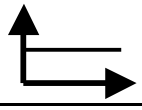
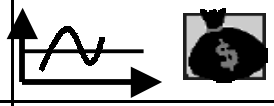
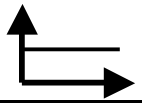
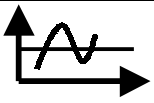
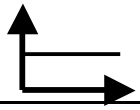
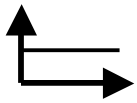
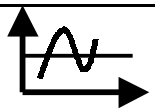
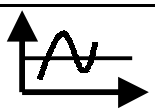
COUNTRY	Tariffs uniformity:	Tariffs differentiation type:
Kyrgyz Republic	-uniform all over the country	-day-night differentiation -the definition of time zones is based on the system's load curve pattern 
Latvia	-uniform all over the country	-differentiation type: hourly zones during the day; day-night -the definition of time zones is based on the system's load curve pattern 
Moldova	-uniform over the region served by a REC	-tariffs are differentiated on hourly zones during the day -the definition of time zones is based on pricing policy **OTH**
Poland	-uniform over the region served by a REC	-differentiation type: hourly zones during the day; day-night; weekend seasonal periods -the definition of time zones is based on pricing policy 
Romania	-uniform all over the country	-differentiation type: hourly zones during the day; day-night; weekend; -the definition of time zones is based on the system's load curve pattern 
Russian Federation	-in the wholesale market, within zones (Central, Northwest, South, Urals, Siberia, Far East). -in the consumer (retail) market, within individual constituent members of the federation regulated by regional energy commissions.	-differentiation of time zones. there are six zones in the Russian Federation, each of which has its own wholesale market tariff -the retail market uses single-rate, dual-rate, and zonal tariffs. -time zones are based on system load curve and pricing policy 
Ukraine	-uniform over the country only for the public -uniform over the region served by a REC – in the region rates are differentiated on the basis of voltage levels (two classes)	-differentiation type: hourly zones during the day and day-nigh (for the public if there are certain types of meters) -time zones are based on system load curve pattern 

Table 9. Overview of time differentiation

Country	Generation	Transmission	Distribution	End-users
Albania	-	-	-	
Armenia				
Bulgaria		-	-	
Estonia		-		
Georgia				
Hungary		-	-	
Latvia				
Moldova				
Poland				
Romania				
Russian Federation		-		
Ukraine				
Kyrgyz Republic	-	-	-	

3. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER WORK

Major conclusions of this paper include:

1) In most of the countries, activities in the sector were unbundled. Due to poor competition or lack of competitors, in many countries the activities that aren't natural monopolies and normally should be competitive still have regulated prices. The regulated utility sector and its regulatory institutions are not as good as a competitive market in solving this difficult problem and sometimes political influence might happen. Although it is primarily the role of other government organizations to deal with social safety issues, it is very common the practice of transferring these problems to energy sector. Increasingly, regulators need to stress this point, in an effort to ensure that government assumes its proper role and the distortions that can result from energy sector/regulatory involvement are minimized.

2) The difficulty is that the energy sector has historically been used as a means for implementing social policy. This may make it difficult in the near-term to eliminate the role of the regulated energy sector, but nonetheless, the objective should be to reduce this involvement over time.

3) Opening the market and introducing competition in the areas where the activity doesn't have a natural monopoly character will result in a generalized need to introduce time-differentiated tariffs at the end-users. This will result in a much better fit between the cost curve and the revenue curve, and will help send a more accurate economic signal to the consumer.

4) The tariff is an economic signal sent to the consumer. The consumer is expected to react accordingly. One easy way to create a more complex signal is to time differentiate the tariffs. The supplier will obtain benefits due to consumer's response and also due to the fact that the revenues for the supplied electricity in a certain period of time are quite close to the cost induced into the system.

5) Time-differentiation is severely restricted due to the lack of metering equipment and data transmission. Some countries had the possibility to implement time-differentiated tariffs not only for end-users supply but also for other activities.

6) The easiest way to introduce time differentiation is at the end-user level. Implementation process at this level can be accelerated due to the new generation of electronic meters that could be installed gradually, beginning with the largest consumers.

Taking into consideration the purpose of the present paper, some recommendations are highlighted in order to indicate areas where further work of the Tariff Committee may be justified.

1) To the extent that the regulated energy sector is in fact burdened with the responsibilities of the Government, it would be useful to examine how regulatory institutions can monitor and evaluate the ways of accelerating the opening of the market and introducing competition in the areas where the activity doesn't have a natural monopoly character. In this regard, Committee members can review and discuss the progress made by the member countries, the various models used, their advantages and disadvantages.

2) Committee members can discuss in detail how tariffs for each activity are time differentiated, what infrastructure was needed and with what costs, which are the best suited options for the specific conditions of a country.

3) Committee members can present models for end-user tariffs differentiation, the efficiency of the models under specific conditions, share from the accumulated experience.

Topic 2: Cost Allocation Between Heat And Electric Power In Combined Energy Production At Cogeneration Plants

This report was compiled from answers submitted by eight members of the committee (Armenia, Bulgaria, Hungary, Georgia, Lithuania, Moldova, Romania, and Ukraine).

1. Does your country have power plants that are cogeneration plants, i.e., plants that produce both electricity and heat?

No.	Country	Number of cogeneration plants	Names of cogeneration plants
1	Armenia	1) 2) 3)	Razdan Erevan Vanadzor
2	Bulgaria	Yes	No data
3	Hungary	Yes	No data
4	Georgia	1	Tbilisi GRES
5	Lithuania	1) 2) 3) 4)	Vilnius Kaunas Lithuanian Mazheykyay
6	Moldova	1) 2) 3)	Cogen. plant 1 Cogen plant 2 Cogen. plant – NORD
7	Romania	Yes	No data
8	Ukraine	Yes	No data
10 (sic.)	Russia	Yes	No data

2. What is the cogeneration plants' share in thermal consumption and power production?

No.	Country	Cogeneration plants share in thermal consumption and power plant production	Change in thermal output of cogeneration plants	Reasons for change in cogeneration plants' thermal output
1	Armenia	Maximum output of cogeneration plants reached 6.5 million Gcal/yr	During the last 10 years, the output of heat at cogeneration plants decreased to 600,000 Gcal/yr (factor of 10)	Sharp decline in industrial consumption, low ability of the public to pay. Competition from cheap forms of fuel (wood); convenience of limited use of electricity or heating gas.
2.	Bulgaria	32.3% of the capacities of cogeneration plans can operate on a combined cycle; proportion of electricity produced by a cogeneration process is 5%.	In recent years there was a decrease in the use of heat by industry, and for residential and social service consumers.	Competition from heat suppliers. Inability of consumers to pay. Unprofitability of heat generation.
3	Hungary	In 1999, 9.3% of all	During the last 10 years	Decreased use of heat,

		electricity produced was cogenerated. Production of heat by cogeneration plans (together with district heating) used 18.51%of the fuel.	the output of cogeneration plants decreased.	consumers' adoption of individual heat sources, competition, failure to pay, and unprofitability of heat generation.
4	Georgia	Rated power of the cogeneration plant is 155 Gcal/hr.	Sharp drop in the heat demanded from cogeneration plants.	Consumers' inability to pay.
5	Lithuania	In 1996 total heat output from cogeneration plants was 6372 thousand MWhr, in 2000 output was 4498 MWhr.	There was a 30% decrease in heat production from cogeneration plants over the last 5 years.	Not explained.
6	Moldova	In 1998 heat from cogeneration plants was 2868 thousand Gcal. In 2000 output was 2054 thousand Gcal.	There was a 28% decrease in heat output from cogeneration plants.	Drop in industrial use and use by state funded organizations. Inability of the public to pay.
7	Romania	Generation of heat by cogeneration plants constitutes 35% of total heat production in the country; cogeneration plants produce 54% of the electric power.	In the last 10 years the total demand for heat produced by cogeneration plants decreased by 40%.	Decrease in the use by industry, for residences and public facilities. Lack of ability of consumers to pay, unprofitability of production, competition.
8	Ukraine	The proportion of heat produced at cogeneration plants is 4.5%.	Generation of heat by cogeneration plants decreased over the last 10 years.	Decreased use by industry. Competition from other providers.
9	Russia	---	Production of heat by cogeneration plants decreased.	Decreased use by industry. Inability of consumers to pay, unprofitability, competition.

All these countries had cogeneration plants producing both heat and electricity. Relative to total production, the proportion of the electric power and heat produced by cogeneration plants fluctuated within a broad range; however, in all these countries there was a drop in the generation of heat by these plants. The reasons were the same everywhere: decreased use by industry because of decreased production, decreased use for residences and public facilities because of inability to pay, and competition from other heat providers who supplied heat at lower prices.

3. Is heat supplied only to industrial consumers, only to residential consumers, or to both? What is the ratio of the amounts of heat supplied to these categories of consumers?

No.	Country	Characteristics of heat produced by cogeneration plant				
		Heat provided to		Heat generated using:		
		Industrial consumers	Public consumers	Turbine exhaust steam	Reduced steam from boilers	Hot water boilers at cogeneration plant
1	**2**	**3**	**4**	**5**	**6**	**7**
1)	Armenia	Yes	Yes	Yes	No	Yes
2)	Bulgaria	Yes	Yes	Yes	--	--
3)	Hungary	Yes	Yes	Yes	Yes	Yes
4)	Georgia	No	Yes	Yes	No	No
5)	Lithuania	Yes	Yes	Yes	Yes	Yes
6)	Moldova	Yes 8%	Yes 80%	Yes	No	No
7)	Romania	35%	65%	Yes 95%	Yes	Yes 5%
8)	Ukraine	Yes	Yes	Yes	No	Occasionally
9)	Russia	Yes	Yes	Yes	In emergencies	Yes

In the majority of countries the heat generated by cogeneration plants supplies both industrial and public consumers. Heat is mainly produced by exhaust steam from turbines; fresh steam from boilers is used in emergencies or for technologies requiring heat carriers with very high characteristics. Hot water boilers at cogeneration plants are used if the steam turbines do not produce enough heat.

4. Has the cost of heat supplied by cogeneration plants changed over the past few years, and how have costs changed in relation to inflation (have such changes outstripped inflation or trailed behind it)?

In all the countries the cost of the energy produced has increased.

In Armenia the cost of producing hot water increased from 45% to 65% from 1997 to 2001 while the price of a US dollar relative to a dram increasing by 12%.

In Hungary the cost of heat increased even when inflation and changes in fuel prices were factored in.

In Moldova between 1998 and 2000 the cost of heat increased by from 32% to 45% depending on heat source.

In Romania the increase in cost of heat generated at a cogeneration plant was due to inflation alone, the cost of fuel also affected the cost of heat.

Unfortunately, the reports of the other countries did not contain sufficient information to provide a full analysis.

5. What factors account for any changes in the cost of heat supplied:

In all the countries the main reasons for the increase in the cost of heat produced were:

- decreased volume of production and heat output;
- increased outlays – increases in the cost of fuel and other material resources;
- rise in inflation.

6. Existence of competitors and competition for customers. Is there competition in the heating market?

Armenia: A heat market has not developed. The cogeneration plants are monopoly suppliers of steam and hot water in the areas they serve.

Bulgaria: There is virtually no competition in the market for heat, since the heat producing companies are monopolies for the areas they serve. For new buildings, if it is not possible to connect up to an existing heat source, local heat sources are built.

There is an element of competition with regard to electric power, since heat from the cogeneration plant may be replaced by electrical heating, which is currently less expensive.

Gas is beginning to be used for residential heating.

Manufacturers are building their own heat sources, thus decreasing the demand for heat from cogeneration plants.

Hungary: The competition is very small. Transition away from old, inefficient cogeneration units, predominantly involves switching to the use of owns independent heat sources.

Moldova: Some competition has developed in the heat market – people have begun to build their own boiler works.

Romania: There is no competition yet. There is a growing tendency to install small heating boilers in apartments.

Ukraine: There is no problem of competition in the heat market.

Russia: In certain regions and cities, competition has appeared in the heat market. Because of the decreased demand for heat, boiler works have begun to have surplus capacities, which are offered at lower prices than prices charged by operating cogeneration plants. On the whole, this problem does not affect the country much, but in some cities there really is competition on the heat market.

7. What steps have the cogeneration plants owners taken to retain their customers (to increase their market share)?

Armenia: To retain customers, the cogeneration plants: seek new customers within the existing infrastructure; cut costs by using secondary energy resources (Ryazan Cogeneration

Plant), and by transferring part of the 140/25 atm reduced steam to the regenerative recovery at 25 atm. (Yerevan plant).

At the initiative of the Yerevan Cogeneration plant and a group of industrial consumers, starting on 0/01/01, the Energy Commission of the Republic of Armenia introduced a system of sliding rates for steam at 13 atm., which will apply all the savings realized through cogeneration to the price of heat. The goal of this is to interest industrial consumers in purchase of steam produced through cogeneration and to insure the stability of cogeneration plant operation.

Bulgaria: All the cogeneration plants producing heat for the market (and not just for their own needs, which occurs with industrial cogeneration plants) are government property (with the exception of one).

These companies do not have serious economic motivation to seek new customers, regardless of the fact that decreased production worsens economic performance indicators. Retention of consumers and expansion of the market for heat depends on the initiative of the plant administrations.

The main measures to decrease costs are directed at fuel consumption and have had insignificant results given the decreased consumption of heat.

No serious modernization has been undertaken to decrease costs because of limited funds, due to low rates charged for heat.

The shift of costs from heat to electric power has not occurred; rather, the reverse is true.

Hungary: To retain consumers the following measures have been taken:
- installation of new gas turbines, which operate primarily on a cogeneration cycle
- decrease in prices of heat
- active measure to find new consumers (for expanding the market);
- decrease in costs
- shift of part of the production costs from heat to electric power.

Georgia: There has been little change in terms of the increase in the number of heat consumers.

The management of cogeneration plants have made efforts to decrease total expenses in order to decrease the cost of the electric power produced so as to become competitive on the electric power market. The issue of heat production has been relegated to the background, which may be explained by heat consumers' lack of ability to pay.

Moldova: To maintain the centralized heat supply system, The National Energy Regulatory Agency was compelled to shift costs incurred by the cogeneration plant to the advantage of heat prices.

Romania: For this purpose the following measures have been undertaken:
- search for new customers;
- decrease in costs (replacement of fuel, increased efficiency of productive capacities to decrease the cost of electric power);

- elimination of cross subsidies (payments by the industry for the benefit of public users)

Ukraine: The following was undertaken:
- cost control (replacement of fuel, increase in efficiency);
- mainly, reallocation of part of the cost from heat to electricity.

Russia: Measures undertaken:
- decrease in the cost of heat by decreasing expenditures
- a decision made by the Federal Energy Commission of the Russian Federation to permit differences in levels of profit in production of heat and electric power at a single cogeneration plant (shifting of costs from heat to electric power)
- search for new consumers.

8. Types of rates for heat in use:

Armenia: A single-rate tariff is used for heat. The rate for steam is based on gigacalories used. The rate for hot water is based on gigacalories for public facilities and on square meters to be heated for residential heating during the heating season.

Rates for heat are not differentiated for a given population area. Work is currently under way to develop differentiated rates for heat (based on quality, type of heat carrier, geography of connection etc.)

There are no plans to introduce two-rate tariffs for heat.

Bulgaria: The price for residential consumers is single-component and uniform throughout the country. Starting in 2002 we will begin to introduce two-component rates for stated thermal capacity and heat. We are going to introduce connection charges, which will also include expenses directly associated with connection.

Tariffs for industrial consumers are single-rate. Starting in 2002 the prices will begin to be regulated and two-rate tariffs will be introduced.

Hungary: Two-rate tariffs are used – a charge for the stated thermal capacity and heat.

Georgia: Single-rate tariffs.

Lithuania: Single-rate tariffs.

Moldova: The rate for heat produced by the boilers of a specific cogeneration plant is the same for all users. The National Energy Regulatory Agency sets the rate for each plant.

Romania: Multiple-rate tariffs are used for heat, which include a charge for connection to the thermal grid and for stated thermal capacity and heat carrier.

Ukraine: Tariffs for heat are single-rate. We have differentiated rates based on number of hours of maximum usage, on types and parameters of heat carrier, on site where the heat is delivered (wholesale users from cogeneration plant boilers and grid main lines, and final consumers from distribution grids), and for each district heating system operating in city.

Russia: Basically single-rate tariffs are used. Setting of rates for heat is the prerogative of regional power commissions, the Federal Energy Commission of the Russian Federation only sets rate for heat for federal power plants and also when there are disputes between the regional power commissions and energy supplying organizations.

There are examples of the use of two-component rates in individual regions.

9. Methods used to allocate costs between electricity and heat at cogeneration plants:

Armenia: In allocating its costs, the cogeneration plants use the physical method and all the saving in fuel costs are applied to electric power.

At the same time the Commission believes that this method is inadequate. Allocation of costs between electricity and heat should use a proportional method that takes account of social and economic factors. The greater elasticity of the heat market, resulting from the higher number of alternative sources of heat compared to the electricity market, should also be considered.

Bulgaria: The so-called distributive method is used to allocate costs between heat and electric power. This method involves the following:

- net costs associated with production of the two products are determined. For heat these costs are associated with the hot water boiler and the boiler equipment and for electricity with the generators and substations, etc;
- the amount of fuel consumed to produce heat is determined using the efficiency quotient of the boilers and the coefficient of heat flux;
- the consumption of heat to produce electricity is determined as the difference between the total consumption and the consumption for heat production;
- from the expenditure of electricity for in-house needs we subtract the amount associated with heat generation (hot water boilers, pumps, etc) and the remainder is allocated between the two types of energy proportionally to the expenditure on fuel;
- this principle is also used for allocating the remaining costs for operation and repair, labor wages, general administrative expenses, etc.

Hungary: Economic and social methods for allocating costs are used.

Georgia: Common costs of production are divided into costs to produce electricity and costs for heat on the basis of predictions of costs for the accounting period and the relative amounts of fuel consumed.

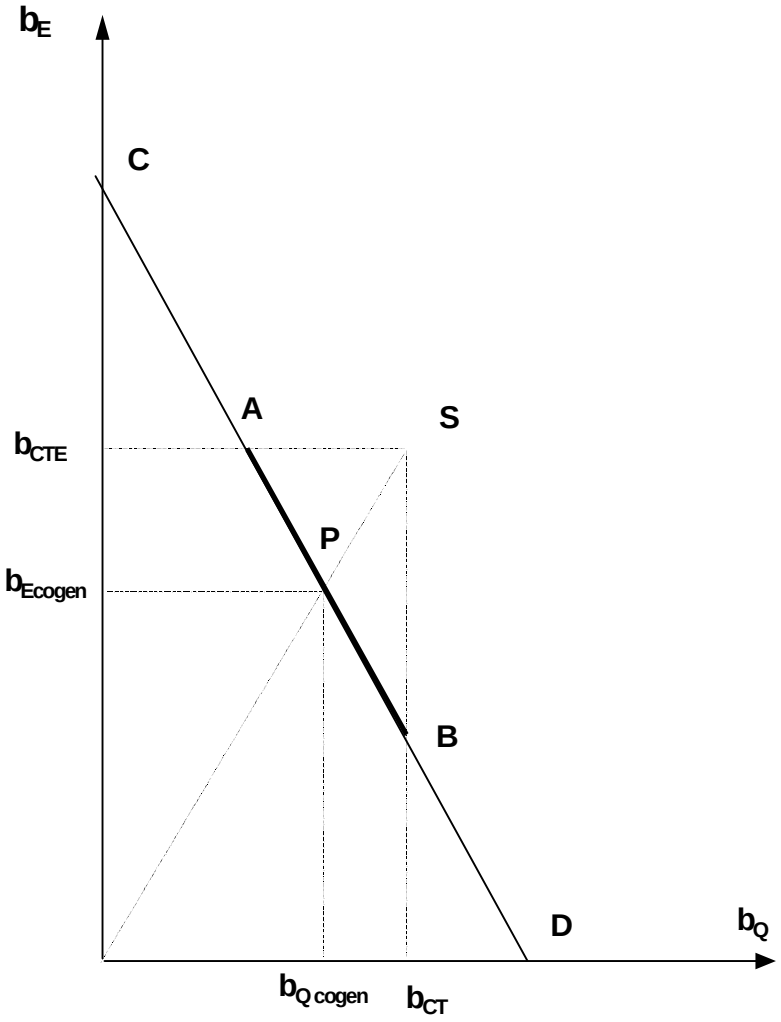
Lithuania: Three of the cogeneration plans use the physical method of cost allocation and one the proportional method.

Moldova: We use the economic method for allocating costs between electricity and heat.

Romania: We use the economic method:

Brief explanation of the method for allocating costs between electric power and heat.

The method used by the National Electricity and Heat Regulatory Agency for allocating costs between cogenerated electric power and heat is based on comparison of the total costs of combined production and the calculated costs for separate production. The costs are subdivided into the following categories: fuel, investment and others. For each category costs are allocated between electricity and heat so as to support profitability of cogeneration of both types of energy. The graph below shows the allocation of fuel costs.



The heat consumption equation is as follows:

$$B_{cogen} = b_{E\,cogen} \times E_{cogen} + b_{Q\,cogen} \times Q_{cogen}$$

or :

$$b_{E\,cogen} = \frac{B_{cogen}}{E_{cogen}} - b_{Q\,cogen} \times \frac{Q_{cogen}}{E_{cogen}}$$

where:

E_{cogen} = cogenerated electric power;
Q_{cogen} = cogenerated heat;
B_{cogen} = total fuel consumption;
$b_{Q\ cogen}$, = specific fuel consumption for heat production;
bE cogen = specific fuel consumption for electricity production;
S = the separate production point;
P = the point obtained by applying the methodology.

Ukraine: The physical method is used for constant costs based on relative amounts of fuel consumed.

Russia: We use the physical method and partially the economic method.

10. Approaches (solutions) you might propose to the development (use) of existing and new methods to allocate costs between electricity and heat at cogeneration plants.

Armenia: No separate answer to this question.

Bulgaria: Beginning in 2002 the price of heat will be determined using the method of residual costs, which consists of the following:

Power plants are divided into two groups:

1. Plants, whose main product is electric power, and heat is a subsidiary (secondary) product.

   – Expenses for production of electric power are taken as equal to expenses for an ideal condensational production with a turbine that generates the same quantity and quality of steam as the cogeneration cycle turbine.

   – The price for the electric power is generally set in accordance with the Decree on Setting and Use of Rates Charged for Electricity, by multiplying by /1-Keg/ where Keg is the "electric charge" coefficient, which is calculated as follows:

$$K_{eg} = \frac{\sum_{i=1}^{n}\left[\frac{M_{ф.ел.i} - M_{н.ел.i}}{M_{н.т.i}}\right] * M_{н.ел.i}}{\sum_{i=1}^{n} M_{н.ел.i}}$$

where:

Keg - "electric charge" coefficient

Mf.el.i – the computed production capacity of one ideal condensation turbine generating the same quantity and quality of steam as a similar cogeneration turbine, MBt;

Mn.el.i – the nominal electricity generation capacity of the turbine in a cogeneration cycle, MBt;

MN.t.i – the nominal heat generation capacity of the turbine in a cogeneration cycle, MBt

n – the number units in a power plant.

The price for electric power is generally set in accordance with the Decree on setting and utilization or rates charged for electricity as follows – the consumption of ideal fuel is determined for each unit of the ideal condensation operating regime and the corresponding turbines with steam collection or resistance.

2. Power plants for which the main product is heat, while electric power is a subsidiary product. In these cases, the price of electric power for all producers is set equal to the "market" price, regardless of the individual expenditures of the power plant. At the present time, this price is defined as the price for power at the most expensive operating condensation plant with an electric power system plus a surcharge set by the Regulatory agency.

The use of surcharges was dictated by the requirements of the Energy Law to the effect that the price of cogenerated electric power must be "preferential" in order to stimulate its production.

The method described has not yet been adopted finally.

Hungary: A market approach is proposed – a combination of the economic and the social method, i.e. a business approach.

Georgia: It is essential, both from a technological and from an economic standpoint, that there be a rational, justified solution to the problem of cost allocation, since the cogeneration of the two types of product in the energy sector does not differ in any way from joint production by companies in other sectors, where they divide common costs and overhead.

At this time, the allocation of production costs is proportional to the consumption of fuel equivalent. Identification of criteria and economic evaluation of technological processes should be based on technical performance parameters; however, when a principle for computing rates for electricity and heat is chosen (including a two component/seasonal/ rate for heat) an approach based on what is commercially beneficial (for the producers) and acceptable (to the consumers) should predominate. In other words, it is essential to develop a method for allocating costs that supports (attains) the optimal level of production of both electricity and heat, and also protects the users of the only source of heat.

This problem must be solved with consideration of an economic milieu that includes consumers' low ability to pay, the relatively high market price of the electricity produced by cogeneration plants compared to that charged by producers of electricity alone, the acceptability of selection and appropriate computation of the optimal combination of "constant (or two-component) rates for electric power and two-component (seasonal) rate for heat."

Moldova: The method for allocating costs used in the republic is the most acceptable, since we have found the optimal solution that allows cogeneration plants to be competitive in the electricity market. In the republic, cogeneration plants produce only 30% of the power, and the prices of electricity generated by these plants have reached the level of imported electricity prices.

Romania: The methodology described above was adopted in 2000. At this time there have been no substantive complaints about it, and we thus believe that there is no urgent need to make any improvements.

Ukraine: All heat supply systems of Ukraine are designed to receive water at 150˚C and return at 70˚C. However, the monopolists have entered an agreement, which allows them to supply the water to the system at a temperature of no more than 70-80 degrees no matter how cold it is outside. This does not provide sufficient heat to the consumers.

Russia: In the majority of regions they use the physical method for allocating costs between electric power and heat. In some individual regions, where competition in heat supply has lead to decrease in heat produced by cogeneration plants, they have begun to use the economic method for computing rates for heat, including bringing profit levels to zero.

Topic 3: Structure Of the Power Sector And Rates Charged For Monopoly Services

I. Basic Issues

1. The development (rehabilitation) of the electric power sectors in the countries of Central and Eastern Europe/Eurasia during the post-Soviet period has progressed at varying rates and in different ways depending on:

    1.1. The initial state of economy and the social situation in a particular country;

    1.2. Political developments and the generally accepted and approved economic policies guiding the country's development;

    1.3. The initial technical condition and financial situation in the power sector;

    1.4. Other factors specific to each country (availability of local energy resources, production volume, availability of generating capacity, the country's size, and other factors).

2. To assess the degree of changes in the power sectors of different countries, we will use the following criteria that characterize the direction and depth of these changes:

    2.1. The existence of independent regulators and their authority and their tasks in implementing government policy in the power industry. Are the regulator's functions clearly defined? Do they duplicate any functions of other government agencies?

    2.2. The development of new power industry legislation that:

        a) fosters a competitive environment in power generation;

        b) ensures the ability of consumers and producers to enter into direct contracts;

        c) promotes competitive market relations (short-term and long-term) and the development of an electric power market (national and regional);

        d) guarantees the right of "third-party access" in vertically integrated environments, combined with the use of transparent (but regulated) rates for services provided;

        e) provides for minimal government interference in business and market relations;

        f) establishes such rates in regulated sectors that ensure i) the revenue necessary to support normal production and business operations, and ii) a reasonable return on investment;

        g) provides for legislative and practical mechanisms to minimize the risk associated with entrepreneurial activity and investment;

h) provides for legal mechanisms to privatize energy companies;

i) provides for the restructuring of the energy sector such as to support market relations in the environment specific for the country in question.

3. The legislation regulating the electric power sector, as well as structural changes and changes in ownership within the sector itself, are in different stages of development in the various countries of CEE/Eurasia. The effectiveness and need for these changes are assessed in different ways by the general public, various political groups, regulators, and independent foreign experts. Moreover, no model or concept to guide the development of the power industry and its transition to a market economy has been developed or adopted for the post-Soviet countries, not even in its general form. Nor does such a concept exist for the developed nations. Furthermore, the American (the United States), European (the European Union) and French models that are currently being implemented differ substantially from one another.

4. In our view, the energy industry reforms in the CEE/Eurasia countries should have significant similarities, since their initial situation is almost identical in i) government 100% ownership of the industry, ii) vertical integration of the industry, and iii) centralized government regulation—are identical in all of these countries. Likewise identical are the objectives of these reforms: i) to make the transition to a market economy, ii) to attract investment into the power sector, and iii) to promote national energy security. The regulatory commissions of the various countries will be able to properly assess the direction of current reforms, the need for them, and their effectiveness, provided the commissions have broad authority and stable staffs, are responsible for the development of the energy industry and for efforts to maintain their countries' energy security, and have a sufficiently high level of technical, economic, and legal expertise and access to international experience.

I. System-wide services (central dispatching, billing center, single buyer-seller, and fund administrator).

1. Should all system services be provided by one company, or should different companies support different services? Please provide a brief explanation of what criteria should be used in selecting a particular structure.

The countries of Central and Eastern Europe and Eurasia have adopted different structures for the companies providing system services.

In Albania and Bulgaria a government-owned company provides system services. There are no plans to change this system in the next few years.

As a result of reforms conducted in the power industry of Hungary, starting in 2001 an independent system operator ("Hungarian Power System Operator") has been in operation. It was composed of the resources of the transmission companies. The main tasks of the system operator are:

- dispatching and managing throughput of the power system;
- allocation of demand among power stations;
- organization and monitoring of export and import of electric power;
- issues relating to operating in parallel with foreign power systems.

Georgia has selected a model in accordance with which technical services provided by the dispatching center are separate from commercial services provided by the wholesale power market.

In the opinion of State Energy Agency under the Government of the Kyrgyz Republic, all system services should be concentrated in a single company.

The guidelines for using the Latvian power grid require that there be separate companies: electric power transmission companies, a transmission system operator and a market operator.

In accordance with reforms undertaken in Lithuania, market participants must include the following companies providing system services: a market operator, which is the single buyer-seller and fund administrator; a transmission grid operator that provides central dispatching; and a distribution grid operator that takes care of billing.

In the republic of Moldova, there are no such system services as a single buyer-seller or fund administrator. The power market operates on the basis of bilateral contracts between companies that distribute power and those that produce it, or for import from other countries. The system operator (dispatching center) is a subdivision of the government-owned transmission company. Future plans call for setting up separate companies to transmit electric power and an independent system operator for the national power system.

In the opinion of the National Electricity and Heat Regulatory Authority of Romania, separate companies should be set up to provide system services.

In Ukraine, a single company provides all system services. This system was agreed upon in a Market Agreement, adopted by all members of the market (generating companies, transmission companies, and power supply companies, and also independent power suppliers.)

In Estonia a single company provides all systems services. At the present time these services are being allocated to different companies.

It follows from the brief overview above that the countries of Central and Eastern Europe and Eurasia take different approaches to selecting structures for the electric power sector as a whole and the companies providing system services, in particular. Despite this, we should note something that seems to us important to take into account in selecting the structure for companies providing system services.

In all power systems, the power system operator (dispatching service) generally has responsibility for the safety and reliability of the power system. As for a single buyer-seller, then its commercial interests in some cases may not correspond to the interests of the system operator with regard to ensuring system safety and reliability. From this standpoint, having the buyer-seller and the power system operator be part of the same structure could have negative consequences on the performance of the system operator, which could ultimately decrease system safety and reliability. For this reason, systems with a single buyer-seller should strive to have the system operator be independent from the buyer-seller structure.

2. Who should be the principals (founders) of these companies?
a) the government
b) market participants
c) private companies
d) other

Considering the strategic significance of the power sector, more than half the participant countries supported the opinion that the principals of companies providing system services should be the government. Some also believed that market participants or private companies could also be principals along with the government.

When this question is resolved, it is essential to remember that the companies providing system services must bear some responsibility vis-à-vis the other market participants and must be able to compensate them for losses incurred through their fault. This circumstance might become problematic if the state or a private company that is the principal of these companies does not have the necessary resources to provide compensation for a possible loss. From this point of view, it would be preferable to have the company providing system services are founded by market participants with sufficient resources. However, in this case, measures must be taken to prevent one or several influential market participants from dominating and to work toward a situation where all participants have equal rights in the power market.

3. Should these be for-profit entities? If so, what should be the basis for setting profit levels when designing rates?

In the opinion of the Georgian National Regulatory Commission, companies providing system services should be for not-for-profit, however they should have sufficient resources to cover capital expenses for modernization.

The National Electricity Regulatory Commission of Ukraine also believes that these companies should not be for profit and should be funded on the basis of an estimated budget approved by the regulatory agency. If market participants founded these companies, they too should approve this estimate.

The remaining participant countries support the opposite opinion and accept the possibility of companies providing market services making a profit.

Lithuania's National Control Commission for Prices and Energy believes that the structures providing general system services should operate as for profit companies, however, that they should not attempt to obtain the maximum profit. The profit should be defined on the basis of profit standards expressed in percentage of invested capital, taking account of inflation, deflation, expansion of the service area and the needs of the company for new capital.

The Hungarian Energy Office considers that the level of profit should be the same as for other companies in the power sector.

4. Authority and responsibility of each of these companies vis-à-vis market participants.

With regard to authority and responsibility of the companies providing system services vis-à-vis market participants, it should be noted that, in accordance with Lithuania's Law on the

Power Sector, the transmission grid operator must perform the functions of central dispatching and be responsible for power system reliability. The market operator must be responsible for organization of trade in electric power, for its transit and for accounts between internal and external markets. The energy supply (distribution) companies are responsible for billing.

According to the new Law on the Power Industry in Armenia, the operator of the electric power system that provides systems service has the exclusive right to perform:

a) operational technological dispatching of the electric power system;
b) system coordination of generation, import, export, and transit of power, in accordance with existing contracts;
c) computation of the size of facilities at each company for control and protection devices with system significance for the electric power sector and monitoring of their operations;
d) support of parallel operation of the power systems of Armenia and neighboring countries.

While performing the functions of coordination and dispatching, the system operator develops system safety and reliability parameters based on the technical specifications and feedback of market participants.

While serving as a system coordinator and dispatcher, the system operator should ensure the compliance with parameters of system safety and reliability, which are required by the regulations for the power market.

The composition, rights, responsibilities, and types of activity of the companies providing system services are established by the founders (market participants) and laid out in the Grid Code and coordinated with the Energy Commission of the Republic of Armenia, which will issue these companies the appropriate licenses. For the term indicated in the license they will receive the exclusive right to provide one or another system service.

5. Criteria for evaluating the operating efficiency of these companies.

The operating efficiency of companies providing system services may be evaluated using the following criteria suggested by the participant companies:

a) actual indicators of reliability and safety of the power system;
b) appropriate management of flows:
c) amount of profit or loss of these companies;
d) quality of services provided;
e) lack of complaints, increased number of market participants.

6. Planned changes in the provision of monopoly services (changes in structure, status, type of ownership, functions, etc.) at various stages of the changeover to market relations in your country's power sector.

As was noted above, reforms are being undertaken in the electric power sector of the countries of Central and Eastern Europe and Eurasia. They also cover the area of provision of monopolistic services.

In the power sector of Georgia they are considering the desirability of uniting the transmission grid and the dispatching center into a single government-owned company. At the present time these are separate government stock companies.

In Lithuania, they plan to divide the vertically integrated system into four large producers, an operator of the transmission system with a dispatching center, a market operator, two distribution grid operators (including two state-owned power supply companies) and independent power supply companies. The generators, distribution companies and independent power supply companies must be private stock companies and the transmission system and market operators will be state companies.

The reforms conducted in Romania stipulate privatization in the area of generation and distribution of power, while the transmission companies will remain state property.

II. Power Transmission

1. What type of ownership should these companies have?
a) government
b) private
c) other

The majority of the participant countries believe that the form of ownership for power transmission companies should be government ownership. They also approve such versions as a stock company, with the government holding the majority shares. It should be noted that the ownership of transmission companies may be allowed to remain with the government, if the government is able to make the necessary investments and maintain the transmission companies in the appropriate technological condition.

2. What kind of rate structure should transmission companies have?
a) single-part rates
b) two-part rates
c) fixed charges

As for rates for transmission companies, there are different opinions. Both one-part and two-part rates are considered desirable.

We cite several approaches of the Energy Commission of the Republic of Armenia, which has decided to switch the base rate for transmission companies from one-part to two-parts.

The revenue needed by the transmission company will come from fixed payments from the wholesale buyer-seller and variable payments depending on the amount of power transmitted.

A portion of the required revenue sufficient to pay all the constant costs of the transmission company with the exception of the amount of wear on capital assets will be paid from the fixed payments. The fixed payments will be paid by the wholesale buyer-seller and the variable payments in the form of equal monthly payments.

The variable payments, which depend on the amount of power transmitted, will be used for the portion of revenues needed to compensate for wear on capital assets and formation of the permissible level of profit for the transmission companies.

This allocation is based on the principle that amortization and profit should be computed on the basis of the amount of productive and actually used capital assets. The more power transmitted using the existing assets, the greater will be the coefficient of their use and thus the higher the amount of compensation for wear and profit.

3. In many of the CEE/Eurasia countries, these companies have excess transmission capacity. Should rates be used to cover their maintenance costs and depreciation:
a) in full
b) only for productive and actually used assets, based on the actual usage rather than maximum capacity.

Many of the countries of CEE/Eurasia have excess transmission capacity for electric power. There are differing opinions relative to the question of whether rates should cover expenses for wear and costs of service of these excess capacities. First, that the rates should cover expenses for wear and costs of service in full and that these capacities should constantly be maintained in working condition. This approach is based on plans to use them in the future when the demand on the domestic market, for export, or transit to other countries increases. This approach, if there is a great deal of excess capacity, leads to a noticeable increase in rates for transmission, which may create certain problems for countries where consumers have a relatively low ability to pay. In the second approach it is assumed that rates should only cover expenses for service and wear of productive and actually used assets with account taken of the coefficient of use of equipment and lines, and not the maximum power. This approach succeeds in somewhat restraining the increase in the final rate, however one needs to have an exact idea of the future of the unused capacities in order to make the correct decisions.

4. What should serve as the basis for determining profit levels when setting rates (payments)?
a) all assets
b) only productive and actually used assets.

The Georgian National Energy Regulatory Commission believes that government-owned power transmission companies should be not-for-profit. In the opinion of the regulatory agencies of the remaining participant countries, these enterprises should work for a profit calculate on the basis not of all assets but only the productive and actually used assets of the power transmission company.

5. What changes in the types of ownership of transmission companies and in rate structure are planned in your country?

III. DISTRIBUTION

1. What principles should govern the assignment of consumers to various categories?
a) load
b) consumption
c) capacity
d) *a combination of the above (please specify).*

Rates for each consumer in the ideal case would be established on the basis of the expenses associated with that consumer's power use. However, because of the large number of users and the differences in costs, such an approach is neither practical nor possible. For this reason, it is necessary to group the users so that there is a single rate within each group. This grouping, aside from the convenience of figuring out the payment for use of electric power, makes it possible to provide cross-subsidies as part of social-economic policy and to solve certain problems.

The participant countries have their own opinions on categorizing users and think they should be divided into separate groups on the basis of:

- sector of the economy (industry, agriculture, etc.);
- residential consumers (urban, rural populations)
- form of ownership (government-funded organizations, private sector, etc.).

They also propose to categorize users on the basis of parameters and amount of electricity used:

- on the basis of voltage;
- on the basis of capacity;
- on the basis of consumption.

There is also a point of view that combines these two classifications, so that within one category (for specific sectors of the economy, urban or rural population etc.) they propose to make subcategories based on different amounts of voltage used, or power or total electricity demanded.

We note that the division of users according to the first or third classification schemes provides the opportunity to stimulate the development of one or another sector of the economy. This is achieved by cross-subsidizing and establishing subsidized rates for one group by raising rates for another group, thus doing something to solve the country's social problems.

If the second classification scheme is used, the setting of rates will be based on purely economic considerations. Here, cross subsidies can be eliminated and rates set strictly on the basis of expenses incurred.

It should also be noted that to have rates based on power used and differentiated for different temporal intervals, although it is more acceptable from an economic standpoint, still demands the presence of the appropriate metering system and its practical implementation may be associated with certain technical problems.

2. Should two-part rates be used for certain consumer categories? If so, what criteria should be used to define these categories?

The question of use of two-part rates for certain groups of consumers is a crucial one.

Two-part rates with separate charges for power and for electricity should be used for consumers who use relatively large amount of electricity (power). Payment for power in this case will motivate large users to cut down on power demands while keeping the energy used

constant. This could help to smooth the pattern of demand for electricity over time and decrease the level of power generation required.

3. Should subscription fees be used?
a) yes (for which categories of consumers?)
b) no (why?).

Introduction of the two-part rate for small consumers does not seem economically desirable and would only complicate the accounting system. It would be better to introduce subscription fees for such users.

A subscription fee is a payment for the expenses that the electric power distributing company incurs for all users, regardless of how much energy or power they use. For this reason it should be the same for all users. For large users who play a two-part rate, the subscription fee may not be established separately but included in the payment for power. For small users paying a one-part fee, there should be a separate subscription fee.

It should be noted that, to some degree, setting subscription fees decreases the potential for using cross subsidies, since the users of different amounts of electricity must pay the same subscription fee.

4. Should all consumers of the same category be charged the same rates throughout the country in countries with relatively small territories and populations (such as Armenia, Georgia, etc.)?
a) yes
b) no

Expenses of distribution companies and the structure of electricity use in different regions of the same country are generally different, and thus the rates charged one and the same group of users should be different. However, in countries with relatively small territories and population, setting different rates for the same group of users in different territories throughout the country might create social tensions (especially in countries where the population has trouble paying). To avoid this the rate should be the same for each group of users. This problem may be solved if there is a single seller-buyer of electric power. This makes it possible to average the rate for buying electricity from the generator and within these limits establish different rates for wholesale sales to different distribution companies so as to create the same rates for each group of users.

5. Should distribution companies have exclusive rights to sell electricity in their respective service areas?
a) yes
b) no

When there is cross subsidization, a relatively small number of electric power generators and a large difference in rates for different generators (hydro, cogeneration, and atomic plants) distribution companies should be given the exclusive right to sell power on the territory they service. In the opposite case, the large users in the service territory of the distribution companies could conclude direct agreements for electricity supply with the generators. The amount of power distributed by the distributor would decrease, leading to a decrease in its

revenues. To support the necessary revenues for the distribution companies it would be necessary to raise the rates for the final users. Giving the exclusive right to the distribution company would avoid this undesirable phenomenon.

When the power industry is transitioning to an open market, the exclusive right of distribution companies to sell electricity might be revoked.